

The background is a solid red color. Overlaid on this are several sets of thin, white, curved lines that sweep across the page from the bottom left towards the top right, creating a sense of motion and depth. These lines are most concentrated in the lower half of the image and become more sparse as they move upwards.

HIV Prevention in the United States

At a critical crossroads

Centers for Disease Control and Prevention
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention

The Status of HIV Prevention in the United States

The science is clear: HIV prevention can and does save lives.¹⁻⁴ Scores of scientific studies have identified effective prevention interventions for numerous populations,⁵⁻¹⁰ and it is estimated that prevention efforts have averted more than 350,000* HIV infections in the United States to date.⁴ In addition to the lives saved from HIV, it is estimated that more than \$125 billion in medical costs alone have been averted.^{11,12}

But the HIV crisis in America is far from over. CDC's latest estimates suggest that more than 56,000 Americans become infected each year¹³—one person every 9 ½ minutes—and that more than one million people in this country are now living with HIV.¹⁴ Far too many Americans remain at risk for HIV, especially African Americans, Latinos, and gay and bisexual men of all races. CDC estimates that roughly 1 in 5 people infected with HIV in the United States is unaware of his or her infection and may be unknowingly transmitting the virus to others.¹⁴

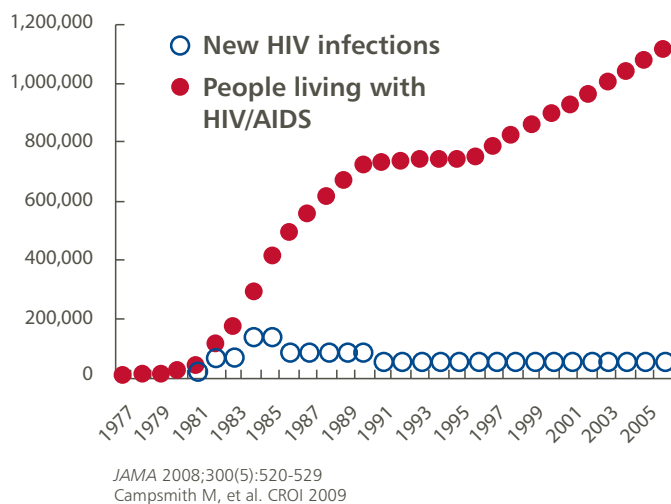
The heavy burden of HIV in the United States is neither inevitable nor acceptable. It is possible to end the U.S. epidemic, but such an achievement will require that we dramatically expand access to proven HIV prevention programs, make tough choices about directing available resources, and effectively integrate new HIV prevention approaches into existing programs.

"It's imperative that we confront a serious threat to the health of our nation. And that threat is complacency – a false sense of security, a false sense of calm that hides what remains a serious epidemic. The fact is that, right here in the United States, every 9 1/2 minutes someone's mother, someone's daughter, someone's son, someone's father, or friend, becomes infected with HIV."

Dr. Kevin Fenton
Director, CDC's National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention

Estimated Number of New HIV Infections and Persons Living with HIV/AIDS, 1977-2006

Despite continued increases in the number of people living with HIV/AIDS over time, and more opportunities for transmission, HIV prevention efforts have helped to keep the number of new infections stable.



*A conservative estimate examining the period 1991 to 2006.

HIV Prevention Works

After almost three decades of experience with HIV in the United States, we know that prevention works.

Our national investment in HIV prevention has contributed to dramatic reductions in the annual number of new infections since the peak of the epidemic in the mid-1980s, and an overall stabilization of new infections over the past decade.¹³ Given continued increases in the number of people living with HIV, this stabilization is in itself a sign of progress (see box, “Measuring the Success of Prevention,” on page 3). Other important signs of progress include dramatic declines in mother-to-child HIV transmission and reductions in new infections among injection drug users and heterosexuals over time.

HIV prevention has also generated substantial economic benefits. For every HIV infection that is prevented, an estimated \$355,000 is saved in the cost of providing lifetime HIV treatment,¹² resulting in significant cost-savings for the health care system.⁴

CDC’s Prevention Efforts

While significant progress has been made, much more must be done. CDC pursues three major strategies to reduce the toll of HIV in the United States:

- **Supporting prevention programs.** CDC provides funding and technical assistance to help state and local health departments and community-based organizations implement evidence-based HIV prevention programs.
- **Tracking the epidemic.** CDC oversees surveillance systems to track new HIV infections and HIV and AIDS diagnoses across the United States, as well as the level of risk behaviors and access to prevention in high-risk populations. This information helps ensure that funding is directed to the populations and communities most in need.
- **Identifying new prevention interventions.** CDC works with research partners to identify and develop new prevention interventions that address the specific needs of populations at risk, so that they can be

broadly disseminated and integrated into local HIV prevention efforts.

Proven HIV Prevention Interventions

We know more than ever before about what works to prevent HIV. Research has led to a growing number of proven, cost-effective approaches to reduce the risk of HIV infection. In the United States, proven strategies include:

- **HIV testing.** Learning one’s HIV status has been shown to result in substantial reductions in risk behavior.¹⁵ Testing is a critical component of prevention efforts because when people learn they are infected, they can take steps to protect their own health and prevent HIV transmission to others.
- **Prevention programs for people living with HIV.** Individual and small-group interventions delivered by health care providers, peers, and others have been shown to significantly reduce risk behaviors among people who have been diagnosed with HIV to help ensure they do not transmit the virus to others.¹⁶ To date, CDC has identified 10 proven interventions for HIV-positive people that meet stringent criteria for efficacy and scientific rigor.¹⁷
- **Prevention programs for people at risk of HIV infection.** Individual, small-group, and community interventions for people who are at risk of HIV infection significantly reduce risk behavior in diverse populations, including men who have sex with men,* heterosexual women and men, drug users, and youth.¹⁶ To date, CDC has identified 53 proven interventions for populations at high risk that meet stringent criteria for efficacy and scientific rigor.¹⁷
- **Partner services.** Partner services reduce the spread of HIV by facilitating the confidential identification and notification of partners who may have been unknowingly exposed to HIV, providing them with HIV testing, and linking them to medical care, prevention programs, and other services.^{18,19}
- **Antiretroviral therapy.** Antiretroviral medications significantly reduce the risk of HIV transmission from HIV-infected pregnant women to their infants^{20,21}

*The term men who have sex with men is used in CDC surveillance systems because it indicates the behaviors that transmit HIV infection, rather than how individuals self-identify in terms of their sexuality.

and, when started promptly, can reduce the risk of infection after exposure to HIV.^{22,23} Researchers are also studying whether antiretroviral medicines given before risk behavior occurs can reduce the chances of becoming infected with HIV²⁴ (see more detailed discussion on page 7).

■ **Substance abuse treatment.** Effective substance abuse treatment that helps drug users stop injecting eliminates the risk of HIV transmission through injection drug use and has been shown to reduce risky sexual behaviors.^{25,26}

■ **Access to condoms and sterile syringes.** In order for HIV prevention efforts to work, people who are living with, or at risk for, HIV need to have access to effective tools that enable them to reduce the risk of HIV transmission. For example, research has shown that increasing the availability of condoms²⁷ and sterile syringes²⁵ is associated with significant reductions in HIV risk.

■ **Screening and treatment for other sexually transmitted infections.** Sexually transmitted infections (STIs) increase an individual's risk of acquiring and transmitting HIV²⁸, and STI treatment may reduce HIV viral load.^{29,30,31} Therefore, STI screening and treatment may reduce risk for HIV transmission.

"The harsh mathematics of this epidemic proves that prevention is essential to expanding treatment. Treatment without prevention is simply unsustainable."

Bill Gates

Co-chair, Bill & Melinda Gates Foundation

Measuring the Success of Prevention: How Do You Count What Doesn't Occur?

Trying to measure what does not occur – the number of infections prevented, illness avoided, and lives saved – is a difficult challenge in HIV prevention. Three key indicators can be used to gauge the impact of HIV prevention efforts on the U.S. epidemic:

■ **Trends in HIV infections.** Examining increases or decreases in estimated HIV infections over time is an important indicator of overall prevention progress, but may mask important signs of success. For example, new HIV infections in the United States declined dramatically after the mid-1980s, and overall have remained roughly stable over the past decade.¹³ This stabilization, however, is an important sign of success. With more people living with HIV than ever before thanks to effective HIV medications,³² there are more opportunities for transmission. Yet the number of infections has not increased, indicating that HIV testing, prevention, and treatment programs are

effectively reducing the rate of transmission (see graph on page 1).

■ **HIV transmission rates.** A useful measure of prevention success is the estimated rate of HIV transmission, which indicates the likelihood that an HIV-infected individual will transmit the virus to others. CDC estimates that there were 5 transmissions per 100 persons living with HIV in the United States in 2006. This means that the vast majority (at least 95%) of people living with HIV did not transmit the virus to others that year. This represents an 89 percent decline in the estimated rate of HIV transmission since the mid-1980s.³³

■ **Modeling of infections averted.** Scientists have developed models to estimate the number of HIV infections that have been averted because of HIV prevention efforts, based on the trajectory of the epidemic before prevention programs were initiated. These models suggest that hundreds of thousands of HIV infections have been prevented because of the nation's HIV prevention efforts.³⁴

Too Many Americans are Still at Risk for HIV

Despite substantial knowledge of how to effectively prevent HIV, there is evidence that populations at greatest risk are not being sufficiently reached by proven prevention interventions and that Americans are becoming complacent about the threat of HIV:

- **Too many people at risk for HIV do not have access to HIV prevention programs.** For example, 80 percent of gay and bisexual men report not being reached by either individual- or group-based prevention programs in the prior year.³⁵
- **Too few people infected with HIV are aware of their infection.** CDC data indicate that roughly

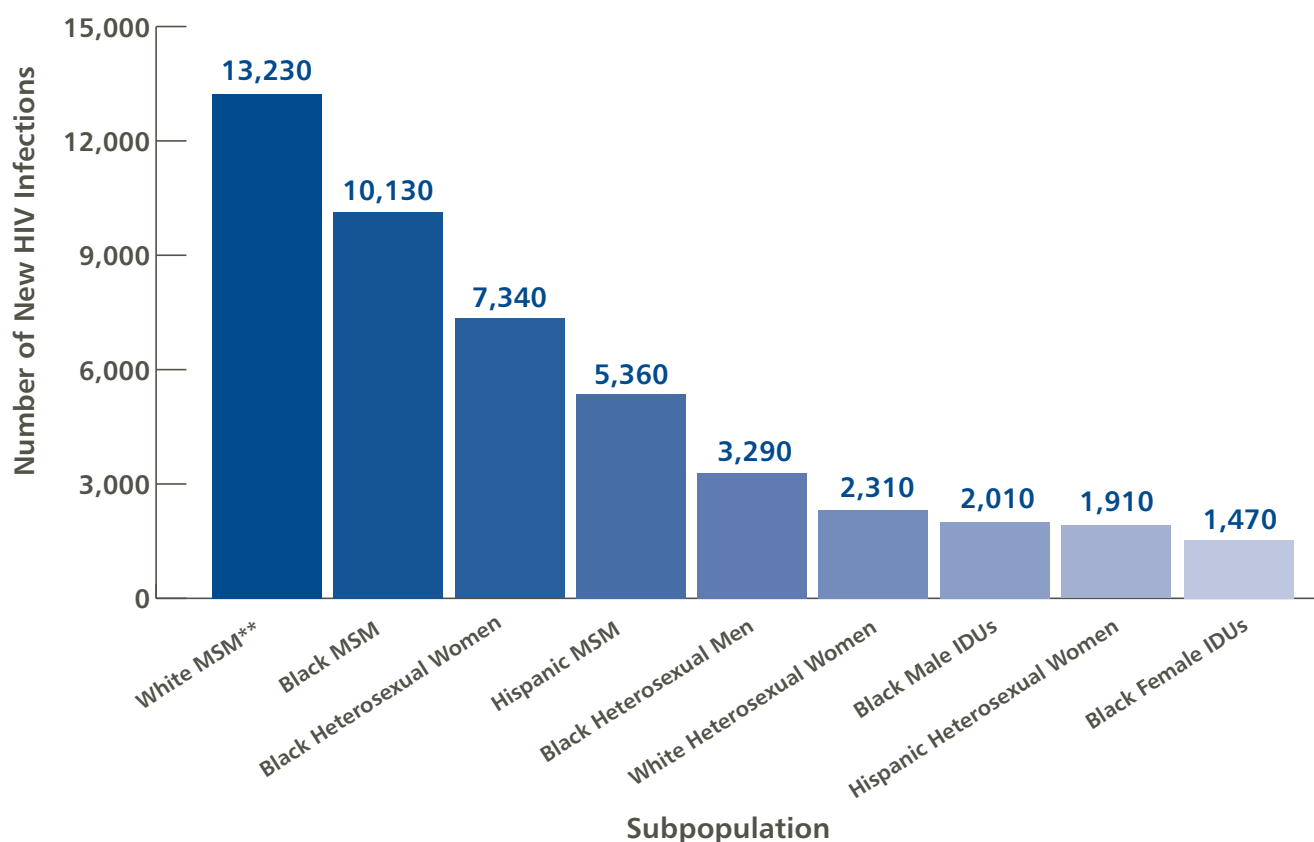
1 in 5 people infected with HIV – more than 200,000 individuals – do not know they have the virus.¹⁴

Because the majority of new sexually transmitted HIV infections are transmitted by those unaware of their infection, undiagnosed infection remains a significant factor fueling the HIV epidemic.³⁶

- **Too many Americans have become complacent about HIV.** A recent survey by the Kaiser Family Foundation found that the percentage of Americans who rank HIV as a major health problem has declined precipitously over the past decade.³⁷ Even more troubling are studies showing that some of the populations with the highest rates of infection (including men who have sex with men and African Americans) either do not recognize their risk or believe HIV is no longer a serious health threat.^{37,38}

Estimates of New Infections, 2006, By Race/Ethnicity, Risk Group, and Gender, for the Most Affected U.S. Subpopulations*

Gay and bisexual men of all races and black heterosexuals account for the greatest number of new HIV infections in the United States.



*Subpopulations representing 2 percent or less of the overall U.S. epidemic are not reflected in this chart.

**The term men who have sex with men is used in CDC surveillance systems because it indicates the behaviors that transmit HIV infection, rather than how individuals self-identify in terms of their sexuality.

Populations at Greatest Risk

Gay and bisexual men of all races and racial/ethnic minorities are disproportionately affected by HIV, comprising the largest number of new HIV infections, HIV and AIDS diagnoses, and deaths among people with AIDS in the United States. Injection drug users also remain at considerable risk, but new HIV infections have been declining in this group.¹³

Men Who Have Sex with Men

While HIV now affects a more diverse population than ever before, gay and bisexual men of all races remain the group most severely and disproportionately impacted by this epidemic.

- MSM transmission represents 53 percent of estimated new infections, followed by transmission through heterosexual sex (31%) and injection drug use (12%).¹³
- MSM is the only risk group in the United States in which infections are increasing – the annual number of new infections has increased steadily since the early 1990s.¹³
- White MSM continue to represent a greater number of new HIV infections annually than any other population, followed closely by black MSM – who are one of the most disproportionately affected subgroups in the United States.³⁹

African Americans

In addition to disparities by risk group, there are also severe racial/ethnic disparities in the U.S. HIV epidemic, with blacks bearing the heaviest burden. While prevention efforts have helped maintain stability in the level of HIV infection among blacks overall since the early 1990s,¹³ the ongoing toll in many black communities across the nation is staggering:

- While blacks represent 12 percent of the U.S. population, they account for nearly half (45%) of new HIV infections.¹³
- Among African Americans, black MSM are the hardest-hit subpopulation.³⁹ Studies have found that almost 50 percent of black MSM are infected in some cities.⁴⁰

- Heterosexual transmission also accounts for a substantial proportion of the black HIV epidemic, with black women most affected. Black heterosexual women represent 14 percent of all new HIV infections in the United States, and black heterosexual men account for 6 percent.³⁹
- Black women, the majority of whom are infected through heterosexual sex, have an HIV infection rate that is nearly 15 times as high as that of white women.³⁹

Latinos

While not as severely impacted as blacks, Hispanics are also disproportionately affected by HIV.

- Hispanics represent approximately 13 percent of the U.S. population, but account for 17 percent of all new HIV infections in the United States each year. The overall HIV infection rate for Hispanics is three times as high as that of whites (29.3 per 100,000 population versus 11.5).¹³
- Among Hispanics, MSM are most heavily impacted, followed by women infected heterosexually.³⁹

"We need to be able to talk about HIV as we talk about jobs, as we talk about housing, as we talk about civil rights. We all have a responsibility to break the silence about this disease."

Dr. Dorothy Height

*Chair and President Emerita,
National Council of Negro Women*

What Will Determine the Future Course of the U.S. HIV Epidemic

Dramatically reducing HIV infection rates in the United States will require a major new commitment to HIV prevention. The future course of the U.S. HIV epidemic will be determined by the scale of our response, and by how effectively we utilize proven and emerging approaches to preventing HIV.

1. Scale of the Response

Research suggests that the size of the nation's investment in HIV prevention predicts future infection rates. Historically, increases in federal investment in HIV prevention have been followed by declines in infection rates.⁴¹ In recent years, federal resources have not been able to keep pace with the epidemic. Since 2002, CDC's HIV prevention budget (approximately \$750 million in FY09) has declined by almost 20 percent in real dollars (adjusted for inflation), and prevention currently accounts for 4 percent of all federal HIV/AIDS spending on the domestic epidemic.^{4,42,43}

At the request of Congress, CDC recently estimated the impact of additional investment on the epidemic. These estimates projected that with an additional \$877 million in annual HIV prevention funding, the reach of prevention programs could be significantly expanded and transmission rates could be cut in half in just over a decade, resulting in dramatic cost-savings and lives saved.⁴⁴ It will take our collective investment—across all levels of government and the private sector—to address the substantial unmet HIV prevention need that has mounted in this country.

2. Making Tough Choices about Directing Available Resources

As the population in need of prevention services has continued to grow in the United States, CDC and the state and local partners it funds have been forced to do more with less. This has resulted in a "triage approach" to public health, in which only the most urgent priorities can be addressed.

The nation has been and will increasingly be required to make difficult choices to ensure that available funds are having the greatest impact on infection rates. Resources

must be directed to the populations at highest risk and to the strategies that are most cost-effective in reducing HIV transmission. As a nation, we must commit to using the best available science and knowledge to guide decision-making at the national, state, and local levels.

CDC is developing new tools to help determine the most effective combination of HIV prevention interventions for specific populations. These tools include:

- **New surveillance systems and analyses.** CDC has developed innovative, technologically-advanced systems to track new HIV infections, monitor HIV risk behaviors, and measure access to effective interventions among high-risk populations. CDC is also working to develop, for the first time, estimates of HIV infection rates (cases per 100,000 population) by individual risk group (e.g., men who have sex with men, injection drug users, and high-risk heterosexuals). To date, this information has only been available for population subgroups assessed by the U.S. Census, such as men and women and racial and ethnic groups. The new data will allow health officials to more accurately estimate the health inequities affecting specific subpopulations (e.g., black MSM), and direct resources accordingly.
- **Cost-effectiveness models.** As data on the effectiveness and costs of a range of prevention approaches continue to accumulate, CDC is developing sophisticated models that will allow a more systematic and precise examination of the cost-effectiveness of specific approaches, help identify the best combination of available interventions, and indicate the most effective allocation of resources to reduce new infections nationally.
- **Analysis of state and local resource targeting.** CDC and other partners are currently analyzing how well federal, state, and local resources are targeted to the geographic areas and populations that bear the greatest burden of HIV. This information will help HIV prevention planners determine what changes may be necessary to ensure that resources are going where they are needed most.

3. Integrating New HIV Prevention Tools into Existing Programs

While existing prevention tools have had a significant impact on the epidemic, there remains an urgent need for new prevention options to reduce the burden of HIV in the United States. CDC, the National Institutes of Health (NIH), and other research partners are evaluating promising new biomedical and behavioral approaches to HIV prevention.

As new prevention interventions become available, it will be critical to use them not in isolation, but in combination with other proven interventions, especially since no single behavioral or biomedical intervention is likely to be 100 percent effective against HIV infection. Biomedical and behavioral interventions will need to be delivered in tandem to ensure that all tools are maximized and avoid migration away from more effective approaches.

A number of promising clinical trials focusing on biomedical strategies are likely to report results in the near future. These include:

- **Pre-exposure prophylaxis.** CDC, NIH, and other research groups are currently investigating whether oral drugs used to treat HIV can be taken by HIV-negative individuals to prevent them from becoming infected with the virus. Known as pre-exposure prophylaxis (PrEP), this strategy is being studied in clinical trials around the world.
- **Microbicides.** Researchers are examining whether the application of vaginal gels containing antiretroviral drugs can effectively prevent HIV transmission during sex. Clinical trials to investigate the effectiveness of several microbicide formulations in preventing heterosexual HIV transmission to women are currently underway.
- **Intensified HIV testing, combined with early HIV treatment.** Because HIV-infected individuals taking antiretroviral medications have lower levels of HIV in their blood than untreated individuals, researchers are investigating whether HIV-positive individuals in treatment are less likely than untreated individuals to transmit HIV. CDC is supporting NIH in research to evaluate the potential feasibility and impact of expanded testing and treatment on prevention.

CDC is also currently evaluating the potential role of adult male circumcision in slowing the U.S. epidemic. This tool was recently proven to reduce female-to-male transmission in African settings. While there are important differences in the routes of transmission and rates of circumcision in the United States and Africa, there may be some subpopulations for whom this could offer additional protection.

Moving forward, it will also be critical to identify effective interventions to address the root societal factors facilitating HIV transmission, including poverty, racism, and stigma. Finally, we must maximize opportunities to address other serious threats to health in those living with and at risk for HIV, including viral hepatitis, other STDs, and tuberculosis.

In the fight to conquer HIV, we stand at a critical crossroads. Significant reductions in HIV are possible with a stronger response to the HIV epidemic in the United States. Unfortunately, without such a response, increases in new infections are also possible. The future of the HIV epidemic will depend on the choices we make today.

"As a nation, now is the time to determine the direction we will take in fighting this serious – yet preventable – disease. One direction leads to complacency and the injustice of an HIV epidemic that affects the most vulnerable of Americans. The other turns toward a re-energized, science-driven effort to reduce the spread of HIV. Public health and our national conscience require we make the right choice."

Dr. Jonathan Mermin

Director, CDC's Division of HIV/AIDS Prevention

References

- 1 Institute of Medicine. No time to lose: getting more for HIV prevention. Washington, D.C.: National Academy Press; 2000.
- 2 National Institutes of Health. Interventions to prevent HIV risk behaviors. NIH consensus statement 1997;15(2):1-41.
- 3 UNAIDS. HIV prevention needs and successes: a tale of three countries. Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS; 2001.
- 4 Holtgrave DR. Written testimony on HIV/AIDS incidence and prevention for the U.S. House of Representatives Committee on Oversight and Government Reform. September 16, 2008. Available at <http://oversight.house.gov/documents/20080916115223.pdf>. (Accessed July 8, 2009)
- 5 Wolitski RJ, Janssen RS, Holtgrave DR, et al. The public health response to the HIV epidemic in the U.S. In: Wormser GP, editor. AIDS and other manifestations of HIV infection. 4th ed. San Diego, CA: Elsevier Academic Press; 2004:997-1012.
- 6 Herbst JH, Sherba RT, Crepaz N, et al. A meta-analytic review of HIV behavioral interventions for reducing sexual risk behavior of men who have sex with men. *J Acquir Immune Defic Syndr* 2005;39:228-41.
- 7 Mullen PD, Ramirez G, Strouse D, et al. Meta-analysis of the effects of behavioral HIV prevention interventions on the sexual risk behavior of sexually experienced adolescents in controlled studies in the United States. *J Acquir Immune Defic Syndr* 2002;30(Suppl 1):S94-S105.
- 8 Neumann MS, Johnson WD, Semaan S, et al. Review and meta-analysis of HIV prevention intervention research for heterosexual adult populations in the United States. *J Acquir Immune Defic Syndr* 2002;30(Suppl 1):S106-S117.
- 9 Semaan S, Desjarlais DC, Sogolow E, et al. A meta-analysis of the effect of HIV prevention interventions on the sex behaviors of drug users in the United States. *J Acquir Immune Defic Syndr* 2002;30(Suppl 1):S73-S93.
- 10 Crepaz N, Lyles CM, Wolitski RJ, et al. Do prevention interventions reduce HIV risk behaviours among people living with HIV? A meta-analytic review of controlled trials. *AIDS* 2006;20:143-57.
- 11 Holtgrave DR, Pinkerton SD. Updates of cost of illness and quality of life estimates for use in economic evaluations of HIV prevention programs. *J Acquir Immune Defic Syndr* 1997;16(1):54-62.
- 12 Schackman BR, Gebo KA, Walensky RP, et al. The lifetime cost of current human immunodeficiency virus care in the United States. *Med Care* 2006 Nov;44(11):990-97.
- 13 Hall HI, Song R, Rhodes P, et al. Estimation of HIV incidence in the United States. *JAMA* 2008;300(5):520-529.
- 14 CDC. HIV prevalence estimates – United States, 2006. *MMWR* 2008; 57(39):1073-76.
- 15 Weinhardt LS, Carey MP, Johnson BT, et al. Effects of HIV counseling and testing on sexual risk behavior: a meta-analytic review of published research, 1985-1997. *Am J Public Health* 1999;89(9):1397-1405.
- 16 CDC. Evolution of HIV/AIDS prevention programs – United States, 1981-2006. *MMWR* 2006;55:597-603.
- 17 CDC. 2008 compendium of evidence-based HIV prevention interventions. Available at <http://www.cdc.gov/hiv/topics/research/prs/evidence-based-interventions.htm>. (Accessed July 8, 2009)
- 18 Hogben M, McNally T, McPheeters M, et al. The effectiveness of HIV partner counseling and referral services in increasing identification of HIV-positive individuals: a systematic review. *Am J Prev Med* 2007; 33(2 Suppl):S89-100.
- 19 CDC. Recommendations for partner services programs for HIV infections, syphilis, gonorrhea, and chlamydial infection. *MMWR* 2008;57(No. RR-9):1-83.
- 20 Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. *N Engl J Med* 1994;331:1173-80.
- 21 Perinatal HIV Guidelines Working Group. Public health service task force recommendations for use of antiretroviral drugs in pregnant HIV-infected women for maternal health and interventions to reduce perinatal HIV transmission in the United States. April 29, 2009; pp 1-90. Available at <http://aidsinfo.nih.gov/ContentFiles/PerinatalGL.pdf>. (Accessed July 8, 2009)
- 22 CDC. Case-control study of HIV seroconversion in health-care workers after percutaneous exposure to HIV-infected blood – France, United Kingdom, and United States, January 1988-August 1994. *MMWR* 1995;44:929-33.
- 23 CDC. Antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV in the United States: recommendations from the U.S. Department of Health and Human Services. *MMWR* 2005;54(No. RR-2):1-20.
- 24 Cohen MS, Gay C, Kashuba AD, et al. Antiretroviral therapy to prevent the sexual transmission of HIV-1. *Ann Intern Med* 2007 Apr 17;146(8):591-601.
- 25 Fuller CM, Ford C, Rudolph A. Injection drug use and HIV: past and future considerations for HIV prevention and interventions. In: Mayer KH, Pizer HF, editors. HIV prevention: a comprehensive approach. London: Academic Press/Elsevier; 2009:305-339.
- 26 Drumright LN, Colfax GN. HIV risk and prevention for non-injection substance users. In: Mayer KH, Pizer HF, editors. HIV prevention: a comprehensive approach. London: Academic Press/Elsevier; 2009:340-375.
- 27 Cohen DA, Farley TA, Bedimo-Etame JR, et al. Implementation of condom social marketing in Louisiana, 1993 to 1996. *Am J Public Health* 1999;89:204-8.
- 28 Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted disease to sexual transmission of HIV infection. *Sex Transm Infect* 1999;75(1):3-17.
- 29 Baeten JM, Strick LB, Lucchetti A, et al. Herpes simplex virus (HSV)-suppressive therapy decreases plasma and genital HIV-1 levels in HSV-2/HIV-1 coinfecting women: a randomized, placebo-controlled, cross-over trial. *J Infect Dis* 2008 Dec 15;198(12):1804-8.
- 30 Zuckerman RA, Lucchetti A, Whittington WL, et al. Herpes simplex virus (HSV) suppression with valacyclovir reduces rectal and blood plasma HIV-1 levels in HIV-1/HSV-2-seropositive men: a randomized, double-blind, placebo-controlled crossover trial. *J Infect Dis* 2007 Nov 15;196(10):1500-8.
- 31 Dunne EF, Whitehead S, Sternberg M, et al. Suppressive acyclovir therapy reduces HIV cervicovaginal shedding in HIV- and HSV-2-infected women, Chiang Rai, Thailand. *J Acquir Immune Defic Syndr* 2008 Sep 1;49(1):77-83.
- 32 Campsmith M, Rhodes P, Hall HI. Estimated prevalence of undiagnosed HIV infection in the United States at the end of 2006. Presented at the 16th Conference on Retroviruses and Opportunistic Infections. Montreal, Canada. February 11, 2009. Available at <http://www.retroconference.org/2009/PDFs/1036.pdf>. (Accessed July 8, 2009)
- 33 Holtgrave DR, Hall HI, Rhodes PH, et al. Updated annual HIV transmission rates in the United States, 1977-2006. *J Acquir Immune Defic Syndr* 2009;50(2):236-238.
- 34 Holtgrave DR. Estimating the effectiveness and efficiency of U.S. HIV prevention efforts using scenario and cost-effectiveness analysis. *AIDS* 2002 Nov 22;16(17):2347-9.
- 35 CDC. Human immunodeficiency virus (HIV) risk, prevention, and testing behaviors – United States, national HIV behavioral surveillance system: men who have sex with men, November 2003–April 2005. Surveillance Summaries, July 2006. *MMWR* 2006;55(No. SS-6):1-16.
- 36 Marks G, Crepaz N, Janssen RS. Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. *AIDS* 2006 Jun 26;20:1447-50.
- 37 Kaiser Family Foundation. 2009 Survey of Americans on HIV/AIDS: summary of findings on the domestic epidemic. April 2009. Available at <http://www.kff.org/kaiserpolls/upload/7889.pdf>. (Accessed July 8, 2009)
- 38 MacKellar DA, Valleroy LA, Secura GM, et al. Perceptions of lifetime risk and actual risk for acquiring HIV among young men who have sex with men. *AIDS Behav* 2007 Mar;11(2):263-270.
- 39 CDC. Subpopulation estimates from the HIV incidence surveillance system – United States, 2006. *MMWR* 2008;57(36):985-989.
- 40 CDC. HIV prevalence, unrecognized infection, and HIV testing among men who have sex with men – five U.S. cities, June 2004 – April 2005. *MMWR* 2005;54(24):597-601.
- 41 Holtgrave DR, Kates J. HIV incidence and CDC's HIV prevention budget: an exploratory correlational analysis. *Am J Prev Med* 2007;32(1):63-67.
- 42 Holtgrave DR. When "heightened" means "lessened": the case of HIV prevention resources in the United States. *J Urban Health* 2007 Sep; 84(5):648-652.
- 43 Kaiser Family Foundation. U.S. federal funding for HIV/AIDS: the FY 2009 budget request. April 2008. Available at <http://www.kff.org/hiv/aids/upload/7029-041.pdf>. (Accessed July 8, 2009)
- 44 CDC. Professional Judgment Budget. Prepared for the U.S. House of Representatives Committee on Oversight and Government Reform. September 16, 2008. Available at <http://oversight.house.gov/documents/20080916102427.pdf>. (Accessed July 8, 2009)

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